16

Patent Claims

1. Method of operating a machine for the manufacture and/or refine-
    ment of material webs, in particular paper webs, in which process
    data concerning at least one measured parameter relating to the
    manufacturing process are detected in the region of at least one ma-
    chine section, in particular the drying section (10) of a paper making
    machine, wherein the process data detection takes place at a plu-
    rality of measurement zones (12) which are arranged in series in the
    process direction (P).

2. Method in accordance with claim 1,
    characterised in that
    the process data detection takes place at least substantially simul-
    taneously, at least with respect to some measurement zones (12).

3. Method in accordance with claim 1 or claim 2,
    characterised in that
    the process data detection takes place in the region of part sections
    (14) in which machine settings can be changed, in particular by
    control and/or regulation of machine components.

4. Method in accordance with at least one of the preceding claims,
    characterised in that
    process data concerning a plurality of different measured parame-
    ters are detected, preferably at least substantially simultaneously.

5. Method in accordance with claim 4,

17

characterised in that

the measured parameters relate to the machine, the material web and to the environment.

6. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic paper parameter, in particular the moisture, the temperature, the thickness or the weight per unit area of a paper web.

7. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a dryer section (10), in particular to a surface characteristic, preferably the surface temperature of a dryer cylinder or of a roll.

8. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).

9. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.

10. Method in accordance with at least one of the preceding claims,

18

characterised in that

one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.

11.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are detected at least substantially uninterruptedly.

12.   Method in accordance with at least one of the claims 1 to 10, characterised in that
the process data are detected at preferably regular time intervals.

13.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing process through, in particular, continuous control or regulation of machine components in dependence on the process data.

14.   Method in accordance with at least one of the preceding claims, characterised in that
machine components are controlled and/or regulated independently of one another on the basis of the process data.

15.   Method in accordance with at least one of the preceding claims, characterised in that

the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.

16. Method in accordance with at least one of the preceding claims, characterised in that
the process data are used for the localisation of disturbances, in particular of faulty machine components.

17. Method in accordance with at least one of the preceding claims, characterised in that
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.

18. Method in accordance with at least one of the preceding claims, characterised in that
the process data are stored in a process data bank.

19. Method in accordance with at least one of the preceding claims, characterised in that
the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.

20. Method in accordance with at least one of the preceding claims, characterised in that
the process data are detected and/or evaluated at a location spatially separated from the machine.

20

21.   Method in accordance with at least one of the preceding claims,
      characterised in that
      the process data are detected in a reflection measurement method.

22.   Method in accordance with at least one of the preceding claims,
      characterised in that
      the process data relate to the material web and are each detected in
      a region at which the material web is guided or supported, in par-
      ticular by a dryer screen, a roll or a cylinder.

23.   Method in accordance with at least one of the preceding claims,
      characterised in that
      the longitudinal profile and/or the course of drying of the material
      web is preferably continuously checked and/or regulated, in par-
      ticular by regulating the heating curve of the dryer section and/or
      regulation of the individual dryer groups, dryers or humidifiers.

24.   Method in accordance with at least one of the preceding claims,,
      characterised in that
      the process data are detected in the dryer section (10) at at least two
      measurement zones (12) in the process direction (P) after the last
      press.

25.   Method in accordance with at least one of the preceding claims,
      characterised in that
      the transverse moisture profile of the material web is regulated pref-
      erably section-wise on the basis of the measured humidity content
      of the material web, in particular by zone-wise regulatable dryers,

21

humidifiers, and/or within the press section (20) with at least one steam blowing box.

26.   Method in accordance with at least one of the preceding claims, characterised in that

the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.

27.   Method in accordance with at least one of the preceding claims, characterised in that

the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.

28.   Measurement system for carrying out the method in accordance with at least one of the preceding claims, with at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement location in a measurement zone (12) and with an evaluation unit (16) for the joint evaluation of the process data.

29.   Measurement system in accordance with claim 28, characterised in that

22

the measurement device is rotatable about an axis or has at least two degrees of freedom, each corresponding to a rotary movement or a linear movement, for the detection of process data at a plurality of measurement locations in one measurement zone (12).

30. Measurement system in accordance with claim 28 or 29, characterised in that the measurement device is movable, in particular approximately perpendicular to the process direction (P) for the measurement of profiles of the respective parameter.

PCT/EP00/02198   S 7473 - Ku/ho

Voith Sulzer Patent GmbH et al.

New Patent Claims 1 - 30

Patent Claims

1.   Method of operating a machine for the manufacture and/or refine-
      ment of material webs, in particular paper webs, in which process
      data concerning at least one measured parameter relating to the
      manufacturing process are detected in the region of at least one ma-
      chine section, ~~in particular the drying section (10) of a paper making
      machine,~~ wherein the process data detection takes place at a plu-
      rality of measurement zones (12) which are arranged in series in the
      process direction (P),
      characterised in that
      process data are detected in a dryer section (10) of a paper making
      machine including a plurality of dryer groups (14) and a respective
      measurement zone (12) including at least one measurement location
      is associated with each dryer group (14).

2.   Method in accordance with claim 1,
      characterised in that
      the process data detection takes place at least substantially simul-
      taneously, at least with respect to some measurement zones (12).

<u>26</u>

3.   Method in accordance with claim 1 or claim 2,

      characterised in that

      the process data detection takes place in the region of part sections
      (14) in which machine settings can be changed, in particular by
      control and/or regulation of machine components.

4.   Method in accordance with at least one of the preceding claims,

      characterised in that

      process data concerning a plurality of different measured parame-
      ters are detected, preferably at least substantially simultaneously.

5.   Method in accordance with claim 4,

      characterised in that

      the measured parameters relate to the machine, the material web
      and to the environment.

6.   Method in accordance with at least one of the preceding claims,

      characterised in that

      one measurement parameter relates to a characteristic paper pa-
      rameter, in particular the moisture, the temperature, the thickness
      or the weight per unit area of a paper web.

7.   Method in accordance with at least one of the preceding claims,

      characterised in that

      one measurement parameter relates to a characteristic value of a
      dryer section (10), in particular to a surface characteristic, prefera-
      bly the surface temperature of a dryer cylinder or of a roll.

<u>36</u>

8. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).

9. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.

10. Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.

11. Method in accordance with at least one of the preceding claims, characterised in that
the process data are detected at least substantially uninterruptedly.

12. Method in accordance with at least one of the claims 1 to 10, characterised in that
the process data are detected at preferably regular time intervals.

13. Method in accordance with at least one of the preceding claims, characterised in that

the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing process through, in particular, continuous control or regulation of machine components in dependence on the process data.

14.   Method in accordance with at least one of the preceding claims, characterised in that
machine components are controlled and/or regulated independently of one another on the basis of the process data.

15.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.

16.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are used for the localisation of disturbances, in particular of faulty machine components.

17.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.

18.   ~~Method in accordance with at least one of the preceding claims, characterised in that~~

<u>56</u>

~~the process data are stored in a process data bank.~~

~~19~~18. Method in accordance with at least one of the preceding claims, characterised in that

the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.

~~20~~19. Method in accordance with at least one of the preceding claims, characterised in that

the process data are detected and/or evaluated at a location spatially separated from the machine.

~~21~~20. Method in accordance with at least one of the preceding claims, characterised in that

the process data are detected in a reflection measurement method.

~~22~~21. Method in accordance with at least one of the preceding claims, characterised in that

the process data relate to the material web and are each detected in a region at which the material web is guided or supported, in particular by a dryer screen, a roll or a cylinder.

~~23~~22. Method in accordance with at least one of the preceding claims, characterised in that

the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.

66

2423. Method in accordance with at least one of the preceding claims,
characterised in that
the process data are detected in the dryer section (10) at at least two
measurement zones (12) in the process direction (P) after the last
press.

2524. Method in accordance with at least one of the preceding claims,
characterised in that
the transverse moisture profile of the material web is regulated pref-
erably section-wise on the basis of the measured humidity content
of the material web, in particular by zone-wise regulatable dryers,
humidifiers, and/or within the press section (20) with at least one
steam blowing box.

2625. Method in accordance with at least one of the preceding claims,
characterised in that
the longitudinal moisture profile of the material web is regulated on
the basis of the measured humidity content of the material web, in
particular by regulating the heating curve of the dryer section
and/or by regulating the individual dryer groups, dryers and/or
humidifiers.

2726. Method in accordance with at least one of the preceding claims,
characterised in that
the course of drying of the material web is regulated on the basis of
the measured moisture content of the material web, in particular by

76

regulating the heating curve of the dryer section and/or regulating
the individual dryer groups, dryers and/or humidifiers.

27.   Method of operating a machine for the manufacture and/or refine-
       ment of material webs, in particular paper webs, in which process
       data concerning at least one measured parameter relating to the
       manufacturing process are detected in the region of at least one ma-
       chine section, in particular the dryer section (10) of a paper making
       machine, wherein the process data detection takes place at a plu-
       rality of measurement zones (12) which are arranged in series in the
       process direction (P), in particular in accordance with one of the
       preceding claims,
       characterised in that
       the process data are deposited in a process data bank which can be
       externally accessed, preferably via the Internet.

28.   Measurement system for carrying out the method in accordance
       with at least one of the preceding claims, with at least one meas-
       urement device for the detection of process data relating to at least
       one measured parameter at at least one measurement location in a
       measurement zone (12) and with an evaluation unit (16) for the joint
       evaluation of the process data,
       characterised in that
       measurement devices are provided in the region of the dryer section
       (10) of a paper making machine including a plurality of dryer groups
       (14) and a respective measurement zone (12) including at least one
       measurement location is associated with each dryer group (14).

<u>86</u>

29. Measurement system in accordance with claim 28,

characterised in that

the measurement device is rotatable about an axis or has at least
two degrees of freedom, each corresponding to a rotary movement or
a linear movement, for the detection of process data at a plurality of
measurement locations in one measurement zone (12).

30. Measurement system in accordance with claim 28 or 29,

characterised in that

the measurement device is movable, in particular approximately
perpendicular to the process direction (P) for the measurement of
profiles of the respective parameter.

Translation of the submission to the EPO of May 27, 2001

File reference: PCT/EP00/02198
Applicants: Voith Paper Patent GmbH et al.

In response to the submission of March 9, 2001:

New patent claims 1 to 30 are submitted on which the further examination proceedings should be based in place of the previous claims.

Likewise enclosed is a version of the claims with remarks relating to the amendments made, with the deletions being marked by the cancelled text and additional text being marked with underlining.

In comparison to original claim 1 the new claim 1 contains the restriction in accordance with which the process data are detected in the region of a dryer section of a paper making machine comprising a plurality of dryer groups and in each case one measurement zone including at least one measurement location is associated with each dryer group, see the characterising part of new claim 1.

The corresponding disclosure can be seen from the following:

The fact that the process data can be detected in the region of a dryer section of a paper making machine is already set forth as an optional feature in original claim 1. The fact that the dryer section can include a plurality of dryer groups is, for example, set forth on page 10, lines 7 and 17 of the original description (see for example also the original claims 23, 26 and 27). In the last paragraph of page 11 of the original description there is talk of "part sections 14" which can be "groups of dryer cylinders" (cylinder

groups). In accordance with page 12, para. 3 of the original description, a respective measurement zone 12 (see also the single Figure) can be associated with each of these part sections 14 (dryer groups) (see, for example, also original claim 3). It can finally be seen from page 3, lines 13 and 14 of the original description, that the measurement zones "can each comprise a plurality of individual measurement points (see, for example, also page 12, para. 1 of the original description.

New claim 27, which is simply optionally dependent on the preceding claims, and accordingly can also be seen as an independent claim, goes back to original claim 18, to original claim 1, from which it depends, and to page 9, paras. 2 and 3 of the original description (see in particular also original claim 19).

The new claim 28 directed to the measurement system contains the same additional restriction as the new method claim 1.

The new claims 2 to 17 correspond to the original claims with the same number. The new claims 18 to 26 correspond to the original claims 19 to 27. The new claims 29 to 30 are identical to the original claims 29 to 30.

The claims 1, 27 and 28 are each delimited over the prior art DE 3901378 A (D1) named at the first position in the official letter.

The restriction contained in new method claim 1 and also in the new claim 28 relating to the measurement system, to a dryer section comprising a plurality of dryer groups and to the (simultaneous) measurement at at least one measurement point of each dryer group is neither anticipated nor rendered obvious by the cited prior art. As a result of the design of the

3

invention, a continuous regulation of the longitudinal profiles and of the drying progress over the region of a plurality of dryer groups and/or, for example, a moisture measurement along the dryer section over a plurality of dryer groups, is now for example possible by an appropriate control of the heating power of each dryer group (temperature of the dryer cylinders), in particular on the basis of the moisture content measurements.

Previously, it was generally customary to effect corresponding measurements only at the end of the dryer section. One could thus admittedly obtain information concerning the corresponding parameters of the finished web, however, no possibility existed of considering the dryer section as a whole. As a result of the design in accordance with the invention it is now not only possible to find faults within the dryer section, but rather action can be taken at different points of the dryer section in order to obtain the desired results.

The document D1 is concerned exclusively with the drying of a coating. Since a respective coating of the web takes place after the dryer section of the relevant paper making machine (see for example also column 1, lines 19 and 20 of D1), the relevant post-drying (drying of the coating) has nothing to do with the dryer section of the paper making machine.

The document D2 is concerned with an optimisation of the thermal treatment of textile products in tensioning, drying and fixing machines. Accordingly, no pointers can be found in the citation D2 with respect to the process data detection in a dryer section of a paper making machine comprising a plurality of dryer groups.

4

The document D3 contains no pointer to the effect that the dryer section 1/9 of the paper making machine shown in Fig. 1 can also include a plurality of dryer groups. Accordingly, there is also a lack of any form of pointer as to how process data detection can take place in a dryer section with a plurality of such dryer groups. The sensors 68 and 69 are temperature sensors with which the temperature inside the steam dryer 21 of one and the same dryer group is measured (see, for example, page 13, lines 17 and 18 of D3).

D4 also contains no pointer as to how the relevant dryer section 28 (Fig. 1) can also include a plurality of dryer groups. Accordingly, this document is also not able to give the person skilled in the art any form of pointer with respect to process data detection in the event of a dryer section comprising a plurality of dryer groups.

The comparable subjects of the new claims 1 and 28 are thus neither anticipated nor rendered obvious by the cited prior art.

The same also applies to the subject of new claim 27. There is also no discussion in any of the named documents that the process data are stored in a bank of process data to which external access can be made via the Internet. The bank of process data set forth in new claim 27 can in particular serve as a basis for a remote diagnosis and/or rapid adaptation of the process when a change of type (of the fibre material web) takes place.

Signed
Patent Attorney
Günther Kurz

Encl. Patent claims 1 - 30 (3-fold)

S 7473 - Ku/ho

PCT/EP00/02198
Voith Sulzer Patent GmbH et al.

New Patent Claims 1 - 30

1. Method of operating a machine for the manufacture and/or refine-
    ment of material webs, in particular paper webs, in which process
    data concerning at least one measured parameter relating to the
    manufacturing process are detected in the region of at least one ma-
    chine section, wherein the process data detection takes place at a
    plurality of measurement zones (12) which are arranged in series in
    the process direction (P),

    characterised in that

    process data are detected in a dryer section (10) of a paper making
    machine including a plurality of dryer groups (14) and a respective
    measurement zone (12) including at least one measurement location
    is associated with each dryer group (14).

2. Method in accordance with claim 1,
    characterised in that
    the process data detection takes place at least substantially simul-
    taneously, at least with respect to some measurement zones (12).

3. Method in accordance with claim 1 or claim 2,
    characterised in that

2

the process data detection takes place in the region of part sections (14) in which machine settings can be changed, in particular by control and/or regulation of machine components.

4.   Method in accordance with at least one of the preceding claims, characterised in that
process data concerning a plurality of different measured parameters are detected, preferably at least substantially simultaneously.

5.   Method in accordance with claim 4,
characterised in that
the measured parameters relate to the machine, the material web and to the environment.

6.   Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic paper parameter, in particular the moisture, the temperature, the thickness or the weight per unit area of a paper web.

7.   Method in accordance with at least one of the preceding claims, characterised in that
one measurement parameter relates to a characteristic value of a dryer section (10), in particular to a surface characteristic, preferably the surface temperature of a dryer cylinder or of a roll.

8.   Method in accordance with at least one of the preceding claims, characterised in that

3

one measurement parameter relates to a characteristic value of a
steam system and/or condensate system of a dryer section (10).

9. Method in accordance with at least one of the preceding claims,
    characterised in that
    one measurement parameter relates to a characteristic value of a
    screen, in particular its temperature, moisture content or perme-
    ability.

10. Method in accordance with at least one of the preceding claims,
    characterised in that
    one measurement parameter relates to a characteristic value of air,
    in particular its temperature or moisture content, or of an airflow, in
    particular its direction or speed in the region of the machine section.

11. Method in accordance with at least one of the preceding claims,
    characterised in that
    the process data are detected at least substantially uninterruptedly.

12. Method in accordance with at least one of the claims 1 to 10,
    characterised in that
    the process data are detected at preferably regular time intervals.

13. Method in accordance with at least one of the preceding claims,
    characterised in that
    the process data are supplied to an evaluation unit (16) which is
    formed for the monitoring and/or influencing of the manufacturing

4

process through, in particular, continuous control or regulation of machine components in dependence on the process data.

14.   Method in accordance with at least one of the preceding claims, characterised in that
machine components are controlled and/or regulated independently of one another on the basis of the process data.

15.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.

16.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are used for the localisation of disturbances, in particular of faulty machine components.

17.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.

18.   Method in accordance with at least one of the preceding claims, characterised in that
the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.

5

19.   Method in accordance with at least one of the preceding claims, characterised in that the process data are detected and/or evaluated at a location spatially separated from the machine.

20.   Method in accordance with at least one of the preceding claims, characterised in that the process data are detected in a reflection measurement method.

21.   Method in accordance with at least one of the preceding claims, characterised in that the process data relate to the material web and are each detected in a region at which the material web is guided or supported, in particular by a dryer screen, a roll or a cylinder.

22.   Method in accordance with at least one of the preceding claims, characterised in that the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.

23.   Method in accordance with at least one of the preceding claims,, characterised in that the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.

6

24.   Method in accordance with at least one of the preceding claims,
characterised in that
the transverse moisture profile of the material web is regulated pref-
erably section-wise on the basis of the measured humidity content
of the material web, in particular by zone-wise regulatable dryers,
humidifiers, and/or within the press section (20) with at least one
steam blowing box.

25.   Method in accordance with at least one of the preceding claims,
characterised in that
the longitudinal moisture profile of the material web is regulated on
the basis of the measured humidity content of the material web, in
particular by regulating the heating curve of the dryer section
and/or by regulating the individual dryer groups, dryers and/or
humidifiers.

26.   Method in accordance with at least one of the preceding claims,
characterised in that
the course of drying of the material web is regulated on the basis of
the measured moisture content of the material web, in particular by
regulating the heating curve of the dryer section and/or regulating
the individual dryer groups, dryers and/or humidifiers.

27.   Method of operating a machine for the manufacture and/or refine-
ment of material webs, in particular paper webs, in which process
data concerning at least one measured parameter relating to the
manufacturing process are detected in the region of at least one ma-

7

chine section, in particular the dryer section (10) of a paper making machine, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P), in particular in accordance with one of the preceding claims,

characterised in that

the process data are deposited in a process data bank which can be externally accessed, preferably via the Internet.

28.   Measurement system for carrying out the method in accordance with at least one of the preceding claims, with at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement location in a measurement zone (12) and with an evaluation unit (16) for the joint evaluation of the process data,

characterised in that

measurement devices are provided in the region of the dryer section (10) of a paper making machine including a plurality of dryer groups (14) and a respective measurement zone (12) including at least one measurement location is associated with each dryer group (14).

29.   Measurement system in accordance with claim 28,

characterised in that

the measurement device is rotatable about an axis or has at least two degrees of freedom, each corresponding to a rotary movement or a linear movement, for the detection of process data at a plurality of measurement locations in one measurement zone (12).

8

30.   Measurement system in accordance with claim 28 or 29,
~~characterised in that~~
the measurement device is movable, in particular approximately
perpendicular to the process direction (P) for the measurement of
profiles of the respective parameter.